is disposed to be inclined such that the gap increases along a rotation direction of the rotor or a configuration in which a gap formed between the horizontal magnetic pole element positioned at the top of the coil and the magnetic body has a size different from that of a gap formed between the horizontal magnetic pole element positioned at the bottom of the coil and the magnetic body. Meanwhile, the result of analyzing the electromagnetic field of the configuration will be described below.

[0062] Also, there is an aspect stated below.

[0063] There is a general motor control circuit configured to alternately turn on or off one of two pairs of transistors diagonally arranged using an H bridge circuit, for example, to convert a direct current (DC) voltage supplied from a power source into an alternating current (AC) voltage and apply the AC voltage to a motor.

[0064] In this configuration, since a through current may instantaneously flow and there is a possibility of transistors stalling when all of the two pairs of transistors are simultaneously turned on, a time in which all of the transistors are turned off (a so-called a dead time) is provided during a time from a state in which one pair of the two pairs of transistors are turned on to a state in which the other pair of the two pairs of transistors are turned on.

[0065] However, in the dead time described above, energy condensed at a coil of the motor flows through a parasitic diode of the transistor as a regenerative current, and a voltage increase of a power line occurs due to a so-called kick back, which has a bad influence on oscillation of the motor or a circuit device.

[0066] Accordingly, a motor control circuit described in Japanese Patent Publication No. 2004-135374 maintains a ground side transistor in an ON state for a longer time than a power source side transistor among one pair of transistors which are turned off to loop regenerative current at a ground side such that regenerative currents flow through a parasitic diode to be consumed.

[0067] It is an aspect of the disclosure which more certainly suppresses a voltage increase of a power line caused by kick back than a general motor control circuit is provided by the one or more inventors as a result of intense consideration.

[0068] That is, in accordance with an aspect of the disclosure, a motor control circuit may include four metal-oxide semiconductor field-effect-transistors (MOSFETs), an H bridge circuit supplying power from a power source to a motor, and a driving circuit which outputs a driving signal to each of the MOSFETs and turns on or off two pairs of MOSFETs that are diagonally arranged one by one. When one pair of the MOSFETs are turned off, the control circuit turns off a ground side MOSFET, and then turns off power a source side MOSFET after a preset certain time passes.

[0069] In the motor control circuit described above, when one pair of the MOSFETs are turned off, since the ground side MOSFET is turned off, and then the power source side MOSFET is turned off after the preset certain time passes, a loop which consumes regenerative currents may be formed at a power source side.

[0070] Accordingly, the regenerative currents may flow through not only the parasitic diode but also several circuit devices such as a condenser or the like installed at the power source side, regenerative power may be more efficiently consumed than in a general motor control circuit, and a voltage increase of a power source line caused by kick back may be more certainly suppressed.

[0071] Also, in accordance with an aspect of the disclosure, a motor control circuit may include four MOSFETs, an H bridge circuit supplying power from a power source to a motor, and a driving circuit which turns on/off two pairs of MOSFETs diagonally arranged one by one by outputting a driving signal to each of the MOSFETs. Also, one pair of regenerative current consuming MOSFETs installed in parallel with two power source side MOSFETs corresponding to power source side MOSFETs are further included. The driving circuit turns on a regenerative current consuming MOSFET corresponding to a power source side MOSFET turned off when one pair of the MOSFETs are turned off.

[0072] In a case of the motor control circuit, a loop which consumes regenerative currents may be formed at the power source by turning on the regenerative current consuming MOSFET corresponding to the power source side MOSFET that is turned off, and effects similar to those of the configuration described above may be obtained.

[0073] Also, in accordance with an aspect of the disclosure, a motor control circuit may include four MOSFETs, an H bridge circuit supplying power from a power source to a motor, and a driving circuit which outputs a driving signal to each of the MOSFETs and turns on or off two pairs of MOSFETs diagonally arranged one by one in a non-conducting state in which the four MOSFETs are turned off. In the motor control circuit described above, when the two pairs of MOSFETs diagonally arranged are turned on or off one by one, the driving circuit turns off all four of the MOSFETs for a preset time to be in the non-conducting state while turning off a ground side MOSFET of one pair of the MOSFETs turned on before the one pair of the MOSFETs are in the non-conducting state and turning on a power source side MOSFET.

[0074] In case of the motor control circuit, since the ground side MOSFET of the one pair of the MOSFETs turned on before the one pair of the MOSFETs are in the non-conducting state is turned off and the power source side MOSFET is maintained to be on, the loop which consumes the regenerative currents may be formed at the power source side and effects similar to the configuration described above may be obtained.

[0075] The four MOSFETs may be N type MOSFETs.

[0076] In the configuration described above, compared with a case of using P type MOSFETs, since the N type MOSFETs have excellent frequency characteristics, heat generated at the MOSFETs when pulse width modulation (PWM) is performed may be suppressed.

[0077] Also, in accordance with an aspect of the disclosure, a motor includes a rotor and a stator including a plurality of stator elements. Each of the stator elements may include a plurality of claw poles formed along a circumferential direction of the stator element and a coil wound along the circumferential direction of the stator element. The claw pole may include a first magnetic pole element and a second magnetic pole element. At least one of the first magnetic pole element and the second magnetic pole element may include a resistor for changing a flow of magnetic flux.

[0078] Since density of magnetic flux at the rotor increases in each of the claw poles due to the change of the magnetic flux caused by the resistor, efficiency of the motor is increased.